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(71) Applicant
Chin-Fu Chung
No. 18 Hsin, Hsing Road, Tainan, Taiwan

(72) Inventor
Chin-Fu Chung

(74) Agent and/or Address for Service
Langner Perry
High Holborn House, 52-54 High Holborn, London,
WC1V 6RR, United Kingdom

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(54) Power-operated toothbrush

(57) In a toothbrush comprising a bristle holder 2 carrying bundles of bristles 25 and connected to a handle 1 housing a battery 11 and a motor 10, a driving shaft 26 of undulating or wave-like form is coupled to the motor via a shaft 15 and gearing 13, 14 and carries a conical gear 4 at its front end to drive a plurality of rotary members 3 each carrying a bundle of bristles. Other bundles of bristles are carried by hollow sliding blocks 23 through which the shaft 26 passes. Rotation of the shaft 26 imparts a lateral vibrating motion to the blocks 23 and hence to the associated bristles, while simultaneously driving the rotary members 3 at the front of the toothbrush. The holder 2 has a water inlet (18, Fig 1) at one end and a water outlet (181) at the other end for cleaning purposes.

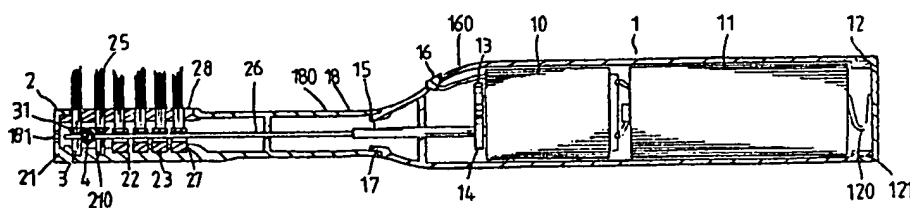
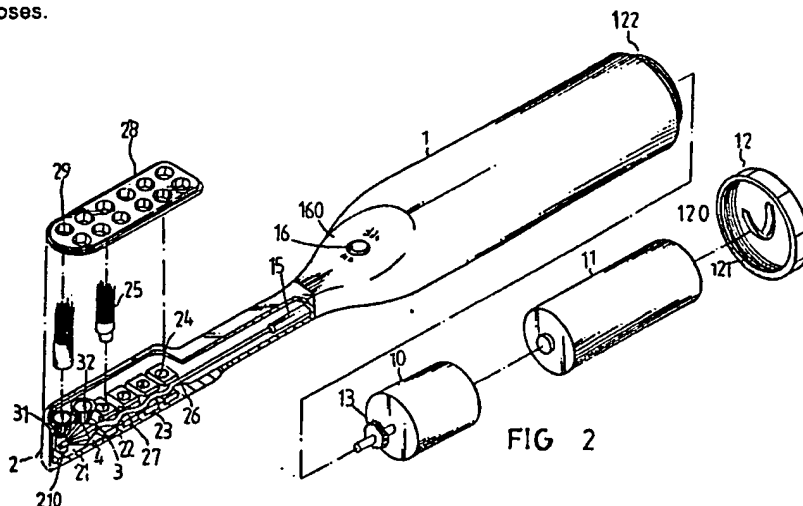
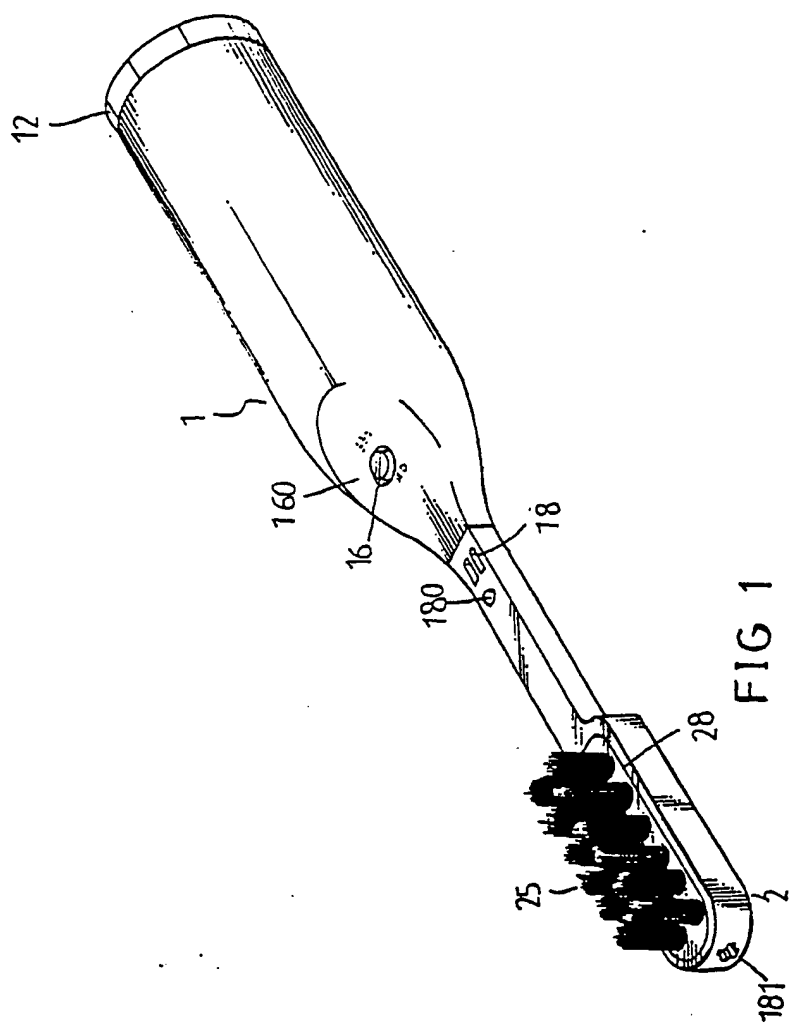
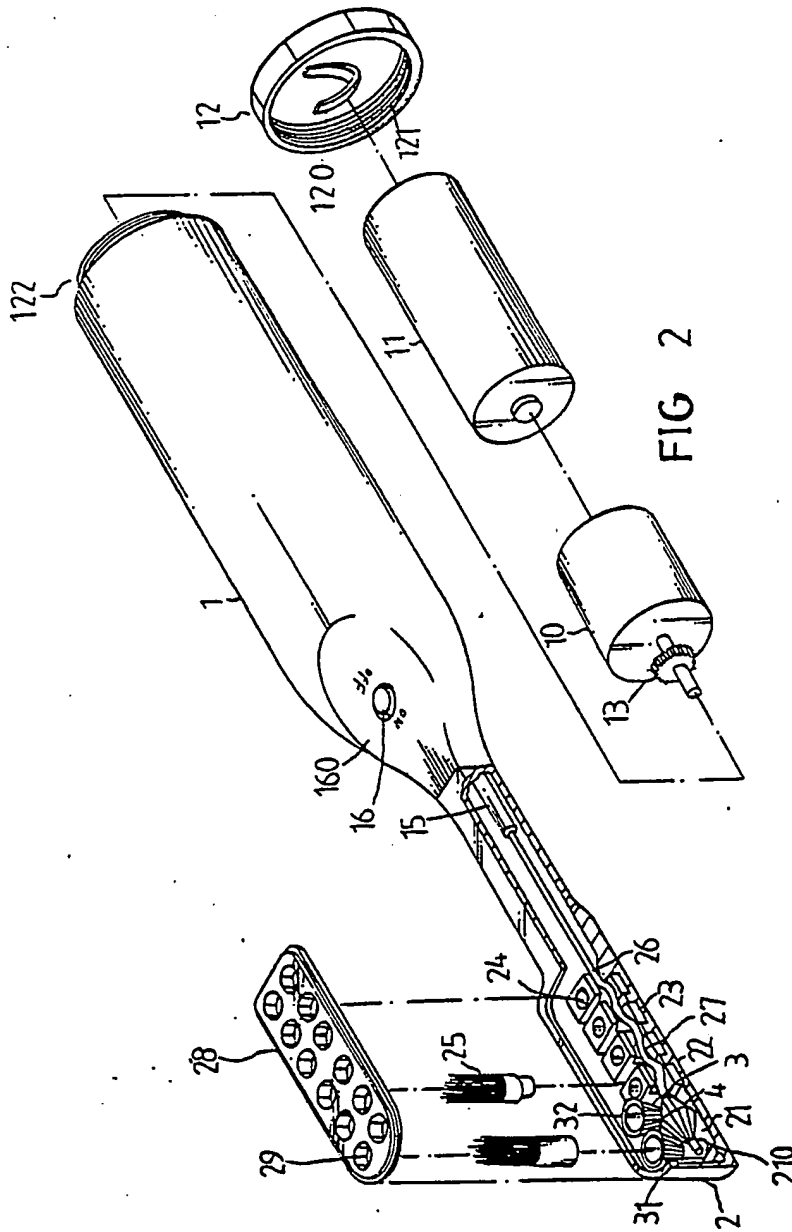


FIG 3

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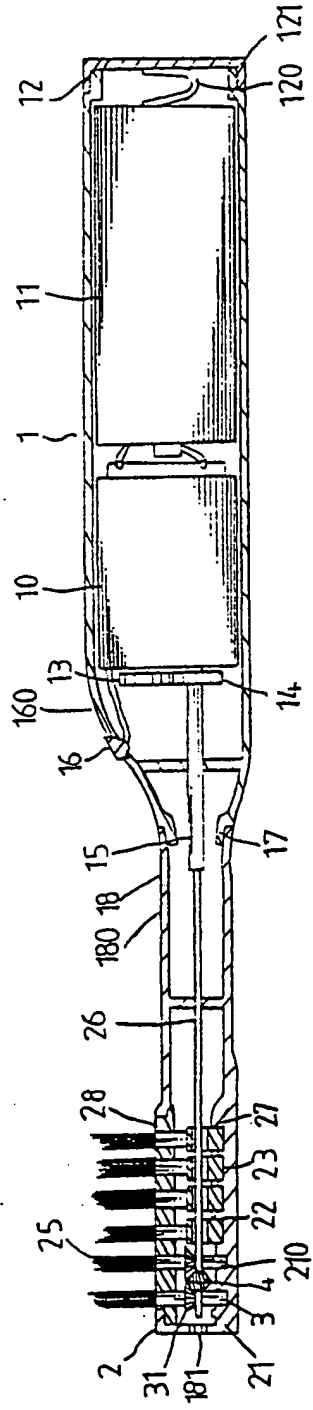


FIG 3

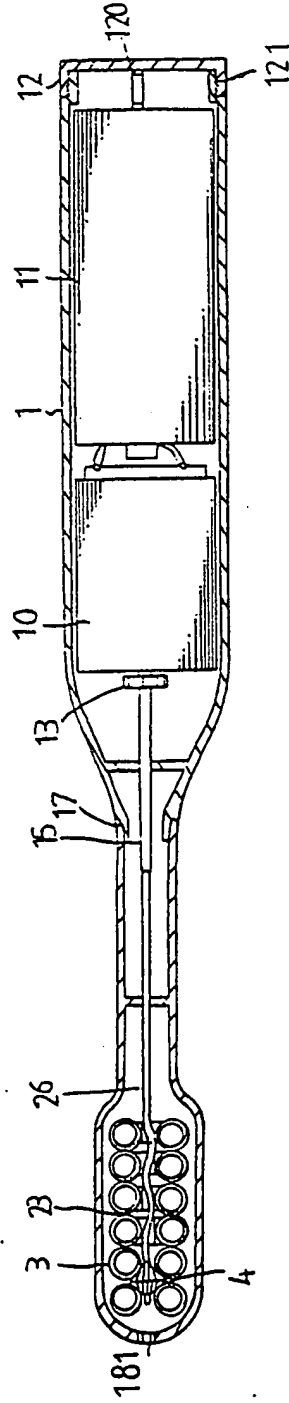


FIG 4

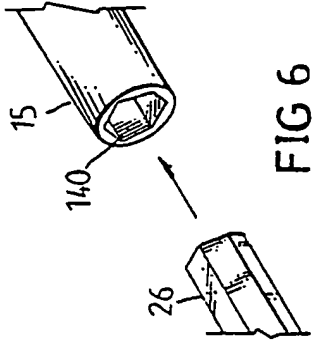


FIG 6

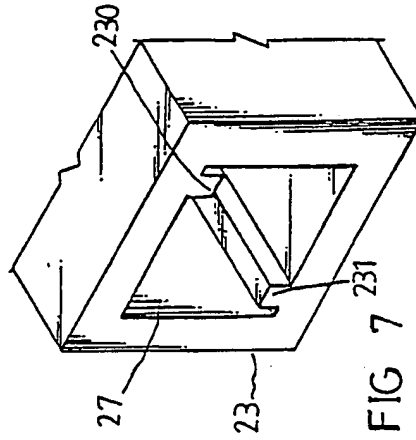


FIG 7

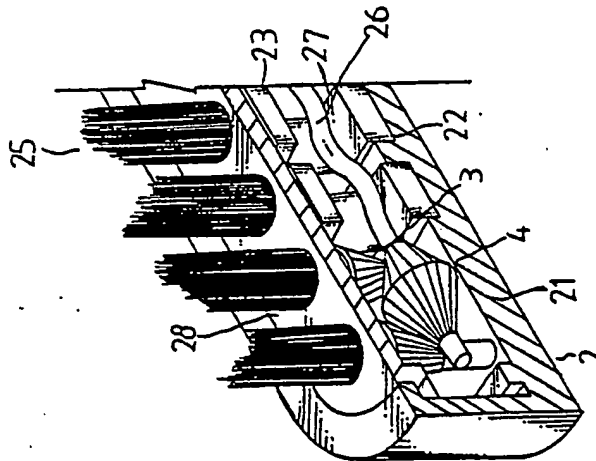
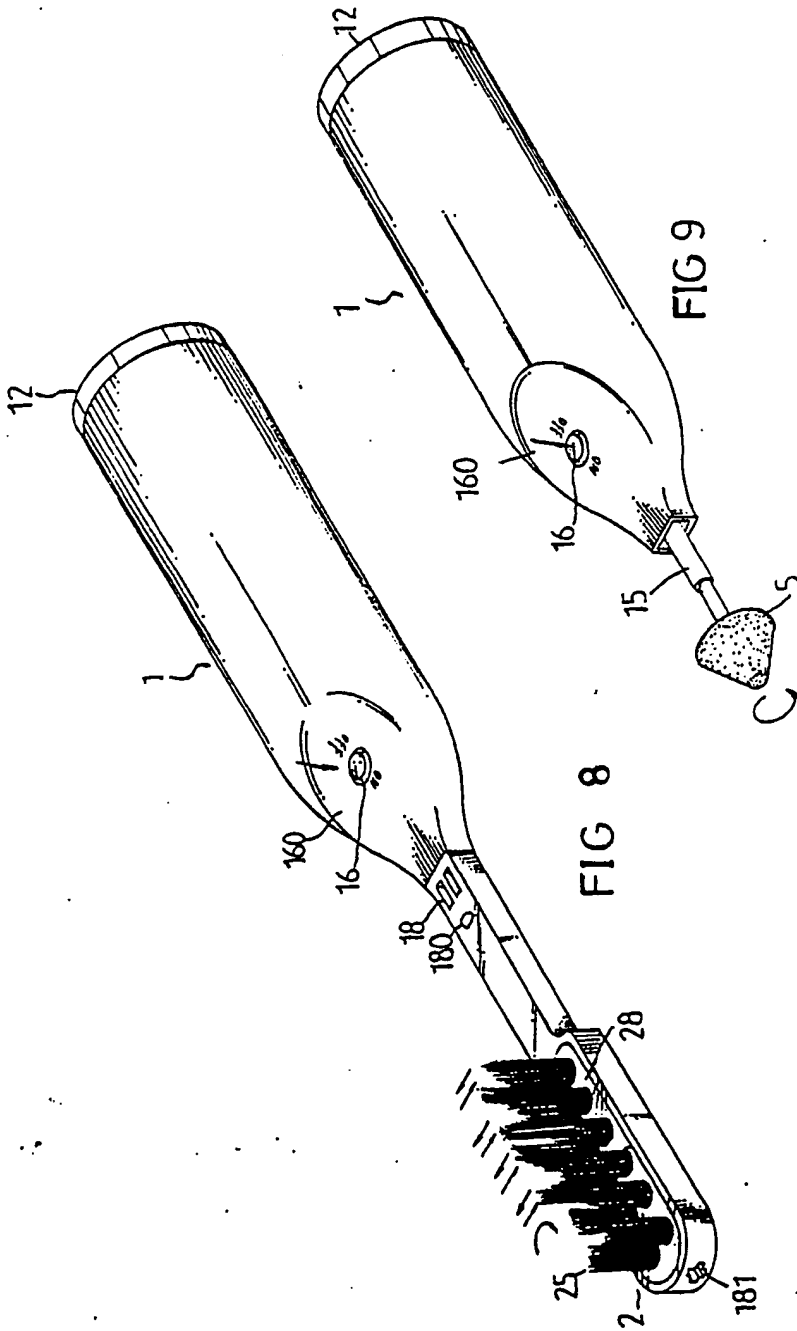


FIG 5



POWER OPERATED TOOTHBRUSH

The present invention relates to toothbrushes and more particularly to a power-operated toothbrush.

5 Regular toothbrush is generally made of plastic material in an unitary piece having a handle portion for the holding of the hand to drive the bristles of the head portion thereof to rub against the teeth. However, conventional toothbrushes generally cannot efficiently clean the gap
10 between the teeth. Sometimes floss pick may be required for cleaning the gap between one's teeth.

 An object of the present invention is to provide a power-operated toothbrush which is compact and
15 inexpensive to manufacture.

 Another object of the present invention is to provide a power-operated toothbrush in which the bundles of bristles can be driven to rotate and vibrate for cleaning the teeth efficiently.

20 Still another object of the present invention is to provide a power-operated toothbrush in which the head can be replaced with a dental bur for treating the teeth.

An embodiment of the present invention will now be described by way of example with reference to the accompanying drawings in which:

5 Fig. 1 is a perspective view of a power-operated toothbrush embodying the present invention;

Fig. 2 is a fragmentary perspective and partly sectional view of the power-operated toothbrush of Fig. 1;

Fig. 3 is a sectional elevation of the power-operated toothbrush of Fig. 1;

10 Fig. 4 is a top sectional view of the power-operated toothbrush of Fig. 1;

Fig. 5 is a partly sectional view of the bristle holder of the power-operated toothbrush of Fig. 1;

15 Fig. 6 illustrates the structure of the transmission shaft and the vibrating shaft of the power-operated toothbrush of Fig. 1;

Fig. 7 illustrates a sliding block according to the present invention;

20 Fig. 8 illustrates the operation of the present invention and shows the moving direction of the of bundles of bristles; and

Fig. 9 illustrates an alternative form of the

present invention.

Refferring to the various drawings attached herewith, a detailed description of the structural features of "a power-operated toothbrush" of the present invention is as follows:-

Referring to Figs. 1 through 3, a power-operated toothbrush of the present invention is generally comprised of a handle 1 and a bristle holder 2. The handle 1 is a hollow cylinder having an outer thread portion 122 for the connection thereto of a cap 12 through screw joint to cover a motor 10 and a battery 11 which are set therein. The cap 12 which is secured to the handle 1 at its rear end comprises internally an electric conducting plate 120 for conducting electricity from the battery 11 to the motor 10. The motor 10 comprises a driving gear 13 engaged with a driven gear 14 which is fixedly mounted on a hollow transmission shaft 15. The transmission shaft 15 has a hexagonal boring bore 140 for the insertion thereto of a wave-like shaft 26 which has a hexagonal cross-section (see Fig. 6). A slop portion 160 is made on the handle 1 at a front area for the mounting thereon of a button switch 16 which controls the operation of the

motor 16 to drive the wave-like shaft 26 to move. The front
end of the handle 1 is relatively reduced and comprises a
projecting flange 17 such that the bristle holder 2 can be
firmly secured thereto when it is inserted therein. The
5 bristle holder 2 comprises therein an inner chamber 20
defining a seat 21 on its bottom, which seat 21 has round
holes 210 thereon bilaterally at its front end respectively
for the setting therein of a plurality of rotary members 3.
The rotary members 3 have each a boring bore 32 for the
10 positioning therein of a bundle of bristles 25, and an outer
thread 31 respectively engaged with a miter gear assembly 4
which is mounted on the wave-like shaft 26 at its front end.
With reference to Figs. 4 and 5, the seat 21 comprises a
plurality of grooves thereon and back to its round holes 210
15 for the positioning therein of a plurality of sliding blocks
23 which have each two round holes 24 bilaterally on its top
for the setting therein of two bundle of bristles 25
respectively. The sliding blocks 23 commonly have a
structure similar to a hollow brick, each comprising a square
20 hole 27 having internally a first projection 230 at one
corner and a second projection 231 diagonally opposite to its
first projection 230. The wave-like shaft 26 penetrates

through the square holes 27 of the sliding blocks 23 and is driven to rotate by the motor 10 via the driving gear 13, a driven gear 14 and the transmission shaft 15. The rotation of the wave-like shaft 26 alternatively pushes the two projections 230 and 231 of each sliding block 23 to cause the sliding blocks 23 to shuck leftward and rightward, and simultaneously drives the rotary members 3 to rotate via the miter gear assembly 4. The bristle holder 2 further comprises a water inlet 18 on its rear part and communicating to a water outlet 181 on its front end. Therefore, water can be filled from the water inlet 18 to drain through the water outlet 181 so as to clean the inner chamber of the bristle holder 2.

A color indicator 180 is made on the rear end of the bristle holder 2 for identification. Every member of a family may have one's own bristle holder (2) for use to match with a common handle (1). There is a cover plate 28 which has conical holes 29 thereon is mounted on the bristle holder 2 covering over the inner chamber 20 permitting the bundles of bristles 25 to protrude therebeyond. In the present embodiment, the cover plate 28 has totally twelve conical holes 29 arranged in two lines for the positioning of twelve

bundles of bristles 25 respectively.

5 With reference to Fig. 8, the battery 11 is
inserted in the handle 1 and the cap 12 is screwed up with
the handle 1 at its rear end. As soon as the button switch
16 is pressed on, the motor 10 turns on to drive the driving
gear 13 to carry the driven gear 14 to rotate so as to
further drive the transmission shaft 15 to carry the wave-
like shaft 26 and the miter gear assembly 4 to rotate.
Therefore, the wave-like shaft 26 drives the sliding block 26
10 to shuck and the miter gear assembly 4 simultaneously drives
the rotary members 3 to rotate, and the bundles of bristles
25 on the sliding blocks 26 and the rotary members 3 are
simultaneously carried to shuck or rotate so as to
effectively brush the teeth.

15 With reference to Fig. 9, therein illustrated is an
alternative form of the present invention. As illustrated,
in lieu of the bristle holder 2, a medical bur 5 may be
attached to the transmission shaft 15 of the handle 1 for
specific use.

CLAIMS:

1. A power-operated toothbrush, including
a handle being hollow cylinder having a cap
attached thereto at its rear end, a motor and a battery
received therein, a sloping surface portion on its outer wall
at its front end with a button switch mounted thereon to
control the operation of said motor, said motor having a
driving gear mounted on its motor shaft and engaged with a
driven gear to carry a transmission shaft; and
a bristle holder comprising an inner chamber
defining a seat on its bottom, said seat comprising a
plurality of rotary members which have each a bundle of
bristles positioned therein, and a plurality of sliding
blocks which have each a bundle of bristles mounted thereon,
a wave-like shaft connected to said transmission shaft of
said handle and having a miter gear assembly mounted thereon
at its front end, said wave-like shaft being set between said
rotary members and said sliding blocks, a water inlet on its
rear end, a water outlet on its front end communicating to
said water inlet, a cover plate mounted thereon covering over
said inner chamber for the protruding therebeyond of the
bundles of bristles of said rotary members and said sliding

blocks;

Wherein the operation of said motor drive said wave-like shaft and said miter gear assembly to rotate, via said driving gear, driven gear and said transmission shaft, to carry said sliding block to shack and said rotary members to rotate so as to simultaneously carry the bundles of bristles thereon to rotate or shack for brushing the teeth.

10 2. A motor-operated toothbrush as claimed in claim 1, wherein said miter gear assembly is comprised of two conical gears oppositely connected together to simultaneously carry four rotary members to rotate.

15 3. A motor-operated toothbrush as claimed in claim 1, wherein the seat of said bristle holder comprises bilaterally a plurality of round holes at its front end for the setting therein of a plurality of rotary members, and a plurality of grooves at its rear end for the setting therein
20 of a plurality of sliding blocks.

4. A motor-operated toothbrush as claimed in claim

1, wherein said rotary members have each a cone-like body comprising a flat top surface with a conical hole vertically penetrating therethrough for the positioning therein of a bundle of bristles.

5

5. A motor-operated toothbrush as claimed in claim 1, wherein the bundles of bristles which are mounted on said sliding blocks comprise each a spherical holder to tightly hold bristles respectively for stably setting in said sliding blocks, said spherical holder being firmly retained in the inner chamber of said bristle holder by said cover plate permitting the bristles thereof to protrude beyond said cover plate.

10

15 6. A motor-operated toothbrush as claimed in claim 1, wherein said sliding blocks have each a square structure comprising bilaterally on its top two round holes for the positioning therein of two bundles of bristles, and defining therein a square hole having internally a first projection at one corner and a second projection diagonally opposite to its first projection, said first and second projections being alternatively pushed by said wave-like shaft to slack

20

leftward and rightward.

7. A motor-operated toothbrush as claimed in claim
1, wherein said cover plate comprises a plurality of holes
5 for the insertion therethrough of the bundles of bristles,
permitting the bundles of bristles of said sliding blocks to
horizontally shuck therein.

8. A toothbrush substantially as hereinbefore
described with reference to, and as illustrated in
Figs 1 to 8; or Fig 9 of the accompanying drawings.

From: Ian J. Wick
To: Jim.ditkoff@danaher.com
Date: 12/15/03 4:33PM
Subject: Gilbarco Reorganization

Jim,

We are still receiving queries on our end about the dating of the amalgamation. Based on your instructions, we are proceeding with an amalgamation date of January 1, 2004. Could you have your Gilbarco counterpart confirm this with the Canadian office, just to alleviate any concern/hesitancy?

Thanks,

Ian J. Wick
KEYSER MASON BALL LLP
Four Robert Speck Parkway
Suite 1600
Mississauga, Ontario
L4Z 1S1

Tel: (905)276-0425
Fax: (905)276-2298
ianwick@kmblaw.com

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CC: nancy.jowett@gilbarco.com